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NEWS 12   SEP 27  STANDARDS will no longer be available on STN
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  substance identification.


=> s (multiphoton or multiple photon)
         13402 MULTIPHOTON
        335822 MULTIPLE
        116796 PHOTON
           955 MULTIPLE PHOTON
                 (MULTIPLE(W)PHOTON)
L1       13877 (MULTIPHOTON OR MULTIPLE PHOTON)

=> s l1 and refractive
         67040 REFRACTIVE
L2          81 L1 AND REFRACTIVE

=> s l1 and refract?
        208965 REFRACT?
L3         109 L1 AND REFRACT?

=> s l3 and visible
        287748 VISIBLE
L4          11 L3 AND VISIBLE

=> d all 1-11

L4   ANSWER 1 OF 11  CAPLUS  COPYRIGHT 2004 ACS on STN
AN   2003:138225  CAPLUS
DN   138:408809
ED   Entered STN:  24 Feb 2003
TI   Multiphoton absorption of solutions of polydiacetylene
     polyDCHD-HS measured using ps Z-scan at 1064 and 1500 nm
AU   Giorgetti, Emilia; Toci, Guido; Vannini, Matteo; Giammanco, Francesco
CS   Istituto di Fisica Applicata "Nello Carrara" -CNR, Florence, 50127, Italy
SO   Optics Communications (2003), 217(1-6), 431-439
     CODEN: OPCOB8; ISSN: 0030-4018
PB   Elsevier Science B.V.
DT   Journal
```

LA English
CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
AB The nonlinear absorption of benzene and toluene solns. of polydiacetylene polyDCHD-HS was measured at λ=1064 and 1500 nm by using Z-scan and picosecond pulses with a trimmed Airy beam configuration. In the data anal., the authors took into account both the saturation of the open aperture Z-scan traces occurring for high values of nonlinear absorption and the possible occurrence of cross-talk effects between nonlinear **refraction** and **multiphoton** absorption. The polymer exhibits three-photon absorption at both 1064 and 1500 nm. The mol. three-photon absorption coefficient at 1064 nm was σ3=1.8 + 10-38 cm6/W2 and σ3=2.3 + 10-38 cm6/W2 in toluene and benzene, resp., while at 1500 nm it was σ3=1.5 + 10-39 cm6/W2 in toluene. On this basis, the optical limiting behavior of polyDCHD-HS in the near IR range is also shown.
ST **multiphoton** absorption polydiacetylene Z scan optical limiting
IT **Multiphoton** absorption
Nonlinear optical absorption
Optical limiting
UV and **visible** spectra
(**multiphoton** absorption of solns. of polydiacetylene polyDCHD-HS measured using ps Z-scan at 1064 and 1500 nm)
IT Polydiacetylenes
RL: PRP (Properties)
(**multiphoton** absorption of solns. of polydiacetylene polyDCHD-HS measured using ps Z-scan at 1064 and 1500 nm)
IT 71-43-2, Benzene, uses 108-88-3, Toluene, uses
RL: NUU (Other use, unclassified); USES (Uses)
(**multiphoton** absorption of solns. of polydiacetylene polyDCHD-HS in benzene or toluene solution)
IT 175736-86-4
RL: PRP (Properties)
(**multiphoton** absorption of solns. of polydiacetylene polyDCHD-HS measured using ps Z-scan at 1064 and 1500 nm)
RE.CNT 29 THERE ARE 29 CITED REFERENCES AVAILABLE FOR THIS RECORD
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L4 ANSWER 2 OF 11 CAPLUS
AN 2003:81478 CAPLUS
DN 138:328164
ED Entered STN: 03 Feb 2003
TI Optical properties of femtosecond irradiated photo-thermo-**refractive** glass
AU Juodkazis, S.
CS Institute of Materials Science and Applied Research, Vilnius University, Vilnius, 2040, Lithuania
SO Lithuanian Journal of Physics (2002), 42(2), 119-126
CODEN: LJPIAD
PB Lithuanian Physical Society
DT Journal
LA English
CC 73-2 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 57
AB Photomodification of optical properties (absorption and **refraction**) of photo-thereto-**refractive** (PTR) glass by its exposure to femtosecond (fs) irradiation is reported. Irradiation was made by fs pulses at the fundamental wavelength of 775 nm and at the 2nd harmonic of 388 nm. Exposure was controlled by focusing and timing of 1 kHz laser radiation. Both wavelengths are out of the absorption band of Ce3+ centered at 304 nm with the bandwidth of .apprx.40 nm. Just this absorption band is responsible for initiation of photomodification, which finally forms a ceramic material at the exposed regions after thermal treatment, typically at 520° for 2 h. Fs illumination can be successfully implemented to record **refractive** index changes comparable to those recorded by continuous-wave exposures to a 325. nm line of He-Cd laser. After the thermal development the **refractive** index changes up to 10-4 were obtained. The mechanism of fs photomodification is discussed in terms of white light continuum (supercontinuum (SC)) generation and **multiphoton** absorption. The model of a silicate glass coloration via the two-photon absorption of fs SC is proposed. It is based on the comparison of coloration of PTR glass with that of alkali- and boro-silicate glasses under fs pulses.
ST optical property irradiated photo thermo **refractive** glass; white light continuum glass laser irradn
IT Defects in solids
(effect of formation of; optical properties of femtosecond irradiated photo-thermo-**refractive** glass)
IT Heat treatment
(effect of; optical properties of femtosecond irradiated photo-thermo-**refractive** glass)
IT Optical absorption
Optical **refraction**
(induced; optical properties of femtosecond irradiated photo-thermo-**refractive** glass)
IT Laser radiation
(irradiation effect; optical properties of femtosecond irradiated photo-thermo-**refractive** glass)

STN search for10/622488

IT   Optical properties
       Refractive index
     Two-photon absorption
     UV and **visible** spectra
        (optical properties of femtosecond irradiated photo-thermo-
        refractive glass)
IT   Silicate glasses
     RL: PRP (Properties)
        (optical properties of femtosecond irradiated photo-thermo-
        refractive glass)
IT   Glass, properties
     RL: PRP (Properties)
        (photo-thermo-**refractive**; optical properties of femtosecond
        irradiated photo-thermo-**refractive** glass)
IT   7681-49-4, Sodium fluoride, occurrence
     RL: OCU (Occurrence, unclassified); OCCU (Occurrence)
        (effect of formation of; optical properties of femtosecond irradiated
        photo-thermo-**refractive** glass)
IT   1305-78-8, Calcium oxide, occurrence   1306-38-3, Cerium dioxide,
     occurrence   1313-59-3, Sodium oxide, occurrence   1314-13-2, Zinc oxide,
     occurrence   1344-28-1, Aluminum oxide, occurrence   7631-86-9, Silicon
     oxide, occurrence   7758-02-3, Potassium bromide, occurrence   20667-12-3,
     Silver oxide
     RL: OCU (Occurrence, unclassified); OCCU (Occurrence)
        (glass containing; optical properties of femtosecond irradiated
        photo-thermo-**refractive** glass)
RE.CNT 33   THERE ARE 33 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE

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L4 ANSWER 3 OF 11 CAPLUS
AN 2002:160423 CAPLUS
DN 136:207766
ED Entered STN: 05 Mar 2002
TI Method and apparatus for laser marking and marked optical materials
IN Hayashi, Kenichi
PA Sumitomo Heavy Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM B23K026-00
ICS B23K026-06; B23K026-08; B41J002-44; C03C023-00; G02B005-18; G02B005-32
CC 74-8 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 73
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2002066769	A2	20020305	JP 2000-257182	20000828
	JP 3522670	B2	20040426		
PRAI	JP 2000-257182		20000828		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2002066769	ICM	B23K026-00
	ICS	B23K026-06; B23K026-08; B41J002-44; C03C023-00; G02B005-18; G02B005-32

AB The apparatus comprises a laser beam source, a hologram plate, an optical scanning system for deflection of the diffraction beams, an optical focusing system for convergence of the diffraction beams, and a stage for placing the marking substrate at the positions where the diffraction beams are converged. Marking of materials by forming multiple nos. of points having varied **refractive** index caused by **multiphoton** absorption is claimed. Optical materials marked with patterns that diffract **visible** light and method for marking are also claimed. Easily **visible** markings are formed without damaging the marked materials.
ST laser marking app optical material; **multiphoton** absorption laser marking; grating laser induced marking holog
IT Holographic diffraction gratings
Laser induced grating
(apparatus for highly **visible** laser marking of materials without their damaging)
IT Marking
(laser; apparatus for highly **visible** laser marking of materials without their damaging)
IT **Multiphoton** absorption
(marking by; apparatus for highly **visible** laser marking of materials without their damaging)
IT Glass, processes
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(marking of; apparatus for highly **visible** laser marking of materials without their damaging)

L4 ANSWER 4 OF 11 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2001:734065 CAPLUS
DN 135:296267
ED Entered STN: 09 Oct 2001
TI Method of making **visible** marks in a transparent material by laser beam radiation, marking apparatus, and transparent optical member marked by the method
IN Hayashi, Kenichi; Ito, Kazuyoshi
PA Sumitomo Heavy Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM B23K026-00
ICS B23K026-00; B23K026-04; B23K026-08; C03C023-00; G02B005-18
CC 74-13 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 73
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2001276985	A2	20011009	JP 2000-258854	20000829
	JP 3522671	B2	20040426		
	US 2002041323	A1	20020411	US 2001-940604	20010829
	US 6621041	B2	20030916		
PRAI	JP 2000-19062	A	20000127		
	JP 2000-258854	A	20000829		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2001276985	ICM	B23K026-00
	ICS	B23K026-00; B23K026-04; B23K026-08; C03C023-00; G02B005-18
US 2002041323	ECLA	G02B005/18M2

AB In marking a transparent material, a laser beam of wavelength capable of transmitting the material is focused on inner part of the transparent material to allow **multiphoton** absorption and cause n changes, and the focal point of the laser beam is so moved as to form a diffraction pattern which diffracts a **visible** ray. An optically marking apparatus is equipped with a stage for loading the material, a light source emitting the laser beam, an optical system for focusing the laser beam, and a means of moving the focal point to form the diffraction grating. A transparent optical member, marked by the method, has the diffraction pattern inside. Alternatively, a method of marking marks in a material comprises the following steps; (1) irradiating the material with a pulsed laser beam by changing NA of an object lens and energy intensity per one pulse (EI) to form optically modified region, (2) determining a function of NA, EI, and length of modified region (LE), (3) determining NA and EI from the required LE by using the function, and (4) irradiating the laser beam to form the modified region. The marking method does not cause damage or drop in strength of the material, and the formed mark can be easily recognized without using a readout apparatus
ST transparent material marking laser radiation n change; diffraction grating formation laser radiation transparent material marking; **multiphoton** absorption laser induced diffraction grating marking; glass marking laser induced diffraction grating
IT **Refractive** index
(changes; making **visible** marks in transparent material by laser beam radiation, marking apparatus, and mark-formed transparent optical

member)
IT **Multiphoton** absorption
(laser radiation; making **visible** marks in transparent material by laser beam radiation, marking apparatus, and mark-formed transparent optical member)
IT Laser induced grating
Marking
Transparent materials
(making **visible** marks in transparent material by laser beam radiation, marking apparatus, and mark-formed transparent optical member)
IT Laser radiation
(pulsed; making **visible** marks in transparent material by laser beam radiation, marking apparatus, and mark-formed transparent optical member)
IT Glass substrates
(transparent; making **visible** marks in transparent material by laser beam radiation, marking apparatus, and mark-formed transparent optical member)

L4 ANSWER 5 OF 11 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2001:262366 CAPLUS
DN 135:38692
ED Entered STN: 13 Apr 2001
TI Polydiacetylene PTS: a molecular quantum wire with exceptional optical properties
AU Trevino-Palacios, Carlos G.; Stegeman, George; Liu, Mingguo; Yoshino, Fumiyo; Poliakov, Sergey; Friedrich, Lars; Flom, Steven R.; Lindle, J. R.; Bartoli, F. J.
CS School of Optics and CREOL, University of Central Florida, Orlando, FL, USA
SO NATO Science Series, II: Mathematics, Physics and Chemistry (2000), 6(Frontiers of Nano-Optoelectronic Systems), 209-226
CODEN: NSSICD
PB Kluwer Academic Publishers
DT Journal
LA English
CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 36
AB The conjugated polymer 2,4-hexadiyne-1,6-diolbis(p-toluenesulfonate) or PTS is a classical example of a 1-dimensional quantum wire. The π-electrons can move more or less freely in 1 dimension. There are large repercussions to this effect in the photonics field, including photocond., and the linear and nonlinear optical response. Growing techniques of crystals with high optical quality as well as measurements on a variety of nonlinear optical effects of PTS are reported in this chapter. These include measurements on the large magnitude of the exciton absorption line, the well-defined vibrational side bands at room temperature, massive 2 and 4 photon absorption coeffs., very large Raman gain coeffs., minimal excited state absorption and a large nonlinear **refractive** index.
ST polydiacetylene PTS mol quantum wire exceptional optical property
IT Quantum wire devices
(mol.; hexadiynediolbis(toluenesulfonate) with exceptional optical properties)
IT IR spectra
(near-IR, transient; of hexadiynediolbis(toluenesulfonate) mol. quantum wire)
IT **Refractive** index
(nonlinear; of hexadiynediolbis(toluenesulfonate) mol. quantum wire)

IT Absorptivity
Degenerate four wave mixing
Excited state absorption
Exciton
Multiphoton absorption
Nonlinear optical properties
Optical properties
Photoconductivity
Raman spectra
UV and **visible** spectra
(of hexadiynediolbis(toluenesulfonate) mol. quantum wire)
IT 32535-60-7, Poly(2,4-Hexadiyne-1,6-diol bis(p-toluenesulfonate))
51853-07-7, Poly(2,4-Hexadiyne-1,6-diol bis(p-toluenesulfonate)), SRU
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(mol. quantum wire with exceptional optical properties)
RE.CNT 26 THERE ARE 26 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
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L4 ANSWER 6 OF 11 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:482928 CAPLUS
DN 133:244952
ED Entered STN: 18 Jul 2000
TI Wavelength dependence of photoreduction of Ag+ ions in glasses through the **multiphoton** process
AU Kondo, Yuki; Inouye, Hideyuki; Fujiwara, Seiji; Suzuki, Toshio; Mitsuyu, Tsuneo; Yoko, Toshinobu; Hirao, Kazuyuki
CS Hirao Active Glass Project, Exploratory Research for Advanced Technolog, Super-Lab 2F6, Japan Science and Technology Corporation, Seika, Kyoto, 619-0237, Japan
SO Journal of Applied Physics (2000), 88(3), 1244-1250

CODEN: JAPIAU; ISSN: 0021-8979
PB American Institute of Physics
DT Journal
LA English
CC 74-1 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 57, 73
AB We have investigated the wavelength dependence of the photoredn. of Ag+ ions in glass irradiated by **visible** femtosecond pulses. These pulses, issued at wavelengths ranging from 400 to 800 nm, were nonresonant with the glass absorption. In this article, a relationship between threshold powers, wavelengths, and linear and nonlinear **refractive** indexes is described. The nonlinear **refractive** index of Ag+-doped glass was measured by an optical Kerr shutter method. The wavelength dependence of threshold powers of the photoredn. is explained by considering linear and nonlinear **refractive** indexes. The mechanism of the photoredn. is also discussed.
ST photoredn silver glass nonlinear **refraction**
IT Aluminosilicate glasses
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); TEM (Technical or engineered material use); PROC (Process); RACT (Reactant or reagent); USES (Uses)
(sodium; wavelength dependence of photoredn. of Ag+ ions in glasses through the **multiphoton** process)
IT Nonlinear optical **refraction**
Photon
Reduction, photochemical
Refractive index
(wavelength dependence of photoredn. of Ag+ ions in glasses through the **multiphoton** process)
IT 1314-13-2, Zinc oxide, uses 1314-60-9, Antimony pentoxide 7681-49-4, Sodium fluoride, uses 18282-10-5, Tin dioxide
RL: TEM (Technical or engineered material use); USES (Uses)
(glass; wavelength dependence of photoredn. of Ag+ ions in glasses through the **multiphoton** process)
IT 14701-21-4, Silver 1+, reactions
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); TEM (Technical or engineered material use); PROC (Process); RACT (Reactant or reagent); USES (Uses)
(wavelength dependence of photoredn. of Ag+ ions in glasses through the **multiphoton** process)
RE.CNT 29 THERE ARE 29 CITED REFERENCES AVAILABLE FOR THIS RECORD
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L4 ANSWER 7 OF 11 CAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:535149 CAPLUS
DN 131:264484
ED Entered STN: 26 Aug 1999
TI Enhanced photosensitivity in germanosilicate fibers exposed to CO2 laser radiation
AU Brambilla, G.; Pruneri, V.; Reekie, L.; Payne, D. N.
CS Optoelectronics Research Centre, Southampton University, Southampton, SO17-1BJ, UK
SO Optics Letters (1999), 24(15), 1023-1025
CODEN: OPLEDP; ISSN: 0146-9592
PB Optical Society of America
DT Journal
LA English
CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 57, 74
AB The authors report a novel method to increase the UV photosensitivity of GeO2:SiO2 optical fibers based on exposure to CO2 laser irradiation before grating writing. Fibers treated with a CO2 laser can produce gratings with **refractive**-index modulation 2 times greater and a Bragg wavelength that can be 2 nm longer than those of untreated fibers. Expts. on GeO2:SiO2 preform samples treated with a CO2 laser in a way similar to the fibers showed a marked increase of the 242-nm absorption band, which is associated with an increase of Ge O-deficient centers and is believed to be responsible for the higher photorefractive response.
ST photosensitivity germanosilicate optical fiber carbon dioxide laser radiation; diffraction grating germanosilicate optical fiber photosensitivity laser irradn; **multiphoton** absorption germanosilicate optical fiber photosensitivity laser irradn; photorefraction germanosilicate optical fiber photosensitivity laser irradn; near IR reflection germanosilicate optical fiber diffraction grating photosensitivity; UV optical fiber preform photosensitivity laser irradn
IT Diffraction gratings
Laser radiation
Multiphoton absorption
Optical fibers
Photorefractive effect
UV and **visible** spectra
(enhanced photosensitivity in germanosilicate optical fibers exposed to CO2 laser radiation with diffraction gratings)
IT IR reflectance spectra
(near-IR; enhanced photosensitivity in germanosilicate optical fibers exposed to CO2 laser radiation with diffraction gratings)
IT Germanosilicate glasses
RL: DEV (Device component use); PEP (Physical, engineering or chemical

process); PRP (Properties); PROC (Process); USES (Uses)
(optical fibers; enhanced photosensitivity in germanosilicate optical fibers exposed to CO2 laser radiation with diffraction gratings)
IT Glass fibers, properties
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(optical germanosilicate; enhanced photosensitivity in germanosilicate optical fibers exposed to CO2 laser radiation with diffraction gratings)
IT Defects in solids
(oxygen-deficient; enhanced photosensitivity in germanosilicate optical fibers exposed to CO2 laser radiation with diffraction gratings)
IT 1310-53-8, Germania, properties 60676-86-0, Vitreous silica
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(enhanced photosensitivity in germanosilicate optical fibers exposed to CO2 laser radiation with diffraction gratings)
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L4 ANSWER 8 OF 11 CAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:54471 CAPLUS
DN 128:198067
ED Entered STN: 30 Jan 1998
TI Linear optical properties and **multiphoton** absorption of alkali halides calculated from first principles
AU Li, Jun; Duan, Chun-gang; Gu, Zong-quan; Wang, Ding-sheng
CS Center for Condensed Matter Physics, Institute of Physics, Laboratory for Surface Physics, Academia Sinica, Beijing, 100080, Peop. Rep. China
SO Physical Review B: Condensed Matter and Materials Physics (1998), 57(4), 2222-2228
CODEN: PRBMDO; ISSN: 0163-1829
PB American Physical Society
DT Journal
LA English
CC 73-4 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 76
AB This paper reports the calcn. of linear optical properties and **multiphoton** absorption (MPA) coeffs. of alkali halides MX (M = Na, K; X = F, Cl, Br, I) using the 1st-principles linearized APW band method and the time-dependent perturbation theory. The calcns. are in good agreement with available exptl. data. For linear optical properties, the trend of the static dielec. consts. with respect to the halides is attributed to the variation of the optical oscillator strength arising from the electronic transitions of the valence p bands. For MPA coeffs. the spectra of 2-photon absorption given in the region of photon energy (1/2Eg, Eg) show an increase of MPA coeffs. with respect to the atomic number of

the halogen elements. The polarization dependence of the MPA coeffs. is also given, which promotes further expts.

ST alkali halide optical property **multiphoton** absorption; sodium halide optical property **multiphoton** absorption; potassium halide optical property **multiphoton** absorption; **refractive** index alkali halide; oscillator strength alkali halide; dielec const alkali halide; band structure alkali halide; two photon absorption alkali halide; UV **visible** alkali halide two photon

IT Band structure
Dielectric constant
Multiphoton absorption
Oscillator strength
Refractive index
Two-photon absorption
(linear optical properties and **multiphoton** absorption of alkali halides calculated from first principles)

IT Alkali metal halides, properties
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(linear optical properties and **multiphoton** absorption of alkali halides calculated from first principles)

IT UV and **visible** spectra
(two-photon; linear optical properties and **multiphoton** absorption of alkali halides calculated from first principles)

IT 7447-40-7, Potassium chloride (KCl), properties 7647-14-5, Sodium chloride (NaCl), properties 7647-15-6, Sodium bromide (NaBr), properties 7681-11-0, Potassium iodide (KI), properties 7681-49-4, Sodium fluoride (NaF), properties 7681-82-5, Sodium iodide (NaI), properties 7758-02-3, Potassium bromide (KBr), properties 7789-23-3, Potassium fluoride (KF)
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(linear optical properties and **multiphoton** absorption of alkali halides calculated from first principles)

RE.CNT 31 THERE ARE 31 CITED REFERENCES AVAILABLE FOR THIS RECORD

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L4 ANSWER 9 OF 11 CAPLUS COPYRIGHT 2004 ACS on STN
AN 1996:708975 CAPLUS
DN 126:39300
ED Entered STN: 29 Nov 1996
TI Writing waveguides in glass with a femtosecond laser
AU Davis, K. M.; Miura, K.; Sugimoto, N.; Hirao, K.
CS Exploratory Research Advanced Technology, Research Development Corporation Japan, Kyoto, G06, Japan
SO Optics Letters (1996), 21(21), 1729-1731
CODEN: OPLEDP; ISSN: 0146-9592
PB Optical Society of America
DT Journal
LA English
CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
AB With the goal of being able to create optical devices for the telecommunications industry, the effects of 810-nm, fs laser radiation on various glasses were studied. By focusing the laser beam through a microscope objective, the transparent, but **visible**, round-elliptical damage lines were written inside high-SiO2, borate, soda lime silicate, and fluorozirconate (ZBLAN) bulk glasses. Microellipsometer measurements of the damaged region in the pure and Ge-doped SiO2 glasses showed a 0.01-0.035 **refractive** index increase, depending on the radiation dose. The formation of several defects, including Si E' or Ge E' centers, nonbridging O hole centers, and peroxy radicals, was detected. Probably **multiphoton** interactions occur in the glasses, and it may be possible to write 3-dimensional optical circuits in bulk glasses with such a focused laser beam technique.
ST waveguide glass writing femtosecond laser
IT Glass, properties
RL: PRP (Properties)
(fluorozirconate; writing waveguides with fs laser in)
IT Lenses
(microscope; writing waveguides in glass with fs laser using)
IT Peroxides, formation (nonpreparative)
RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative)
(radicals; in waveguides written in glass with fs laser)
IT Glass, properties
RL: PRP (Properties)
(silica; writing waveguides with fs laser in)
IT Communication
(telecommunication; writing waveguides in glass with fs laser for)
IT Waveguides
(writing in glass with fs laser)
IT Laser radiation
(writing waveguides in glass with fs)
IT Optical instruments
(writing waveguides in glass with fs laser for)
IT Borate glasses
Soda-lime glasses

RL: PRP (Properties)
(writing waveguides with fs laser in)
IT 7440-56-4, Germanium, uses
RL: MOA (Modifier or additive use); USES (Uses)
(writing waveguides with fs laser in silica glass doped with)

L4 ANSWER 10 OF 11 CAPLUS COPYRIGHT 2004 ACS on STN
AN 1993:112173 CAPLUS
DN 118:112173
ED Entered STN: 19 Mar 1993
TI The lowest excited singlet state of 1,4-diphenyl-1,3-cyclopentadiene
AU Ci, Xiaopei; Kohler, Bryan E.; Moller, Soren; Shaler, Thomas A.; Yee, W. Atom
CS Dep. Chem., Univ. California, Riverside, CA, 92521-0403, USA
SO Journal of Physical Chemistry (1993), 97(8), 1515-20
CODEN: JPCHAX; ISSN: 0022-3654
DT Journal
LA English
CC 73-4 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
AB The authors report a high-resolution excitation spectrum for 1,4-diphenyl-1,3-cyclopentadiene cooled in a supersonic expansion. The spectrum, which was obtained using 2-color resonance-enhanced **multiphoton** ionization techniques, has an origin at 27,008 cm-1. The dependence of absorption and fluorescence spectra on solvent and the vapor phase absorption spectrum shows that the lowest energy excited singlet state in the isolated mol. is the 2A state. The order of excited singlet states reverses in the condensed phase: the 1B state is S1 in solvents with **refractive** indexes of 1.25-1.56. The lifetime of the 2A state in the isolated mol. could not be accurately determined, though an upper bound of 10 ns could be placed on it. These results give insight into the effect that an s-cis conformation in a polyene has on its electronic structure.
ST singlet state lowest excited diphenylcyclopentadiene; phenylcyclopentadiene spectra lowest excited singlet state; cyclopentadiene diphenyl spectra lowest excited singlet; electronic spectra diphenylcyclopentadiene; **multiphoton** ionization spectra diphenylcyclopentadiene; vibrational spectra diphenylcyclopentadiene
IT Fluorescence
Infrared spectra
Molecular vibration
Ultraviolet and **visible** spectra
(of diphenylcyclopentadiene)
IT Electronic structure
(of diphenylcyclopentadiene, conformation effects on)
IT Conformation and Conformers
(of diphenylcyclopentadiene, electronic structure dependence on)
IT Solvent effect
(on electronic spectra of diphenylcyclopentadiene, by organic solvents)
IT Energy level transition
(electronic, radiative, of diphenylcyclopentadiene, fluorescence lifetimes in relation to)
IT Ionization, photo-
(resonant **multiphoton**, two-color, of diphenylcyclopentadiene)
IT Energy level
(singlet, lowest, of diphenylcyclopentadiene)
IT 4982-34-7, 1,4-Diphenyl-1,3-cyclopentadiene
RL: PRP (Properties)
(singlet lowest excited state and electronic and vibrational spectra of, conformation in relation to)

L4 ANSWER 11 OF 11 CAPLUS COPYRIGHT 2004 ACS on STN
AN 1991:617994 CAPLUS
DN 115:217994
ED Entered STN: 15 Nov 1991
TI **Refraction** of molecular gases in the IR laser field
AU Burtsev, A. P.; Korotkov, S. A.; Popov, A. G.; Tret'yakov, P. Yu.; Khikmatov, H. G.
CS USSR
SO Molekulyarnaya Spektroskopiya (1990), 8, 61-76
CODEN: MLKSA9
DT Journal
LA Russian
CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
AB Mach-Zehnder interferometric study of the kinetics of **refractive** index variation Δn during a **multiphoton** absorption of a pulsed IR radiation showed the effect of vibrational excitation on the average mol. polarizability of gaseous SF6, CF3I, (CF3)3CI, OsO4, and CF2Cl2. In the **visible** spectral region, the initial sharp increase in Δh was followed by an oscillatory decay due to a superposition of the vibrational-translational relaxation and an acoustic-wave-induced d. wave in the gas.
ST polarizability mol IR pulse excitation gas; **refractive** index gas IR pulse excitation; sulfur fluoride polarizability IR pulse excitation; fluoromethyl iodide polarizability IR pulse excitation; methyl fluoro iodide polarizability IR excitation; butyl fluoro iodide polarizability IR excitation
IT Laser radiation, chemical and physical effects
(heating of mol. gases by pulsed, **refractive** index variation kinetics in relation to)
IT **Refractive** index and Optical **refraction**
(kinetics of variation of, of mol. gases under pulsed IR laser heating)
IT Polarizability
(of mol. gases under pulsed IR heating)
IT Energy level excitation
(vibrational, of pulsed, of mol. gases, mol. polarizability in relation to)
IT 75-71-8, Dichlorodifluoromethane 2314-97-8, Trifluoroiodomethane
2551-62-4, Sulfur hexafluoride 4459-18-1, Tristrifluoromethyliodomethane
20816-12-0
RL: PRP (Properties)
(**refractive** index variation kinetics of gases, under pulsed IR laser heating)

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=> s (multiphoton or multiple photon) and refract?
         13402 MULTIPHOTON
        335822 MULTIPLE
        116796 PHOTON
           955 MULTIPLE PHOTON
                 (MULTIPLE(W)PHOTON)
        208965 REFRACT?
L5         109 (MULTIPHOTON OR MULTIPLE PHOTON) AND REFRACT?

=> s (multiphoton or multiple photon) and diffract?
         13402 MULTIPHOTON
        335822 MULTIPLE
        116796 PHOTON
           955 MULTIPLE PHOTON
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STN search for10/622488

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                    (MULTIPLE(W)PHOTON)
         418560 DIFFRACT?
L6          106 (MULTIPHOTON OR MULTIPLE PHOTON) AND DIFFRACT?

=> s l5 and l6
L7            9 L5 AND L6

=> d all 1-9
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L7 ANSWER 1 OF 9 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2003:741193 CAPLUS
DN 139:388367
ED Entered STN: 22 Sep 2003
TI Holographic volume gratings in bulk Perylene orange-doped hybrid inorganic-organic materials by the coherent field of a femtosecond laser
AU Qian, Guodong; Guo, Jiayu; Wang, Minquan; Si, Jinhai; Qiu, Jianrong; Hirao, Kazuyuki
CS State Key Lab of Silicon Materials, Department of Materials Science and Engineering, Zhejiang University, Hangzhou, 310035, Peop. Rep. China
SO Applied Physics Letters (2003), 83(12), 2327-2329
CODEN: APPLAB; ISSN: 0003-6951
PB American Institute of Physics
DT Journal
LA English
CC 74-8 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 73
AB Holog. volume gratings with high first-order Bragg **diffraction** efficiency (greater than 35%) were fabricated in bulk laser-dye-doped hybrid inorg.-organic materials by the coherent fields of a femtosecond laser. Observations of optical microscopy show that **refractive** -index-modulated volume gratings were realized inside the sample through **multiphoton** absorption process. The isomerization and alignment of the laser dye mols. are responsible for the grating formation. The authors suggest that the materials co-doped with laser dye and azo-dye and with photoinduced gratings inside are promising materials for making the distributed feedback tunable lasers.
ST holog grating Perylene orange doped hybrid inorg org material
IT Lasers
(distributed feedback, tunable; holog. volume gratings fabricated in bulk of sol-gel derived hybrid inorg.-organic materials doped with laser dye in relation to)
IT Holographic **diffraction** gratings
Hybrid organic-inorganic materials
Multiphoton absorption
(holog. volume gratings fabricated in bulk of sol-gel derived hybrid inorg.-organic materials doped with laser dye)
IT Holography
(holog. volume gratings fabricated in bulk of sol-gel derived hybrid inorg.-organic materials doped with laser dye in relation to)
IT Molecular orientation
(photoinduced; holog. volume gratings fabricated in bulk of sol-gel derived hybrid inorg.-organic materials doped with laser dye)
IT Isomerization
(photoisomerization; holog. volume gratings fabricated in bulk of sol-gel derived hybrid inorg.-organic materials doped with laser dye)
IT 159777-98-7, Perylene orange
RL: MOA (Modifier or additive use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(holog. volume gratings fabricated in bulk of sol-gel derived hybrid

inorg.-organic materials doped with laser dye)
IT 78-08-0, Vinyltriethoxysilane
RL: RCT (Reactant); RACT (Reactant or reagent)
(precursor; preparation of sol-gel derived hybrid inorg.-organic materials)
RE.CNT 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD
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L7 ANSWER 2 OF 9 CAPLUS
AN 2003:92005 CAPLUS
DN 138:346381
ED Entered STN: 06 Feb 2003
TI Photofabrication of periodic microstructures in azo dye-doped polymers by interference of laser beams
AU Si, J. H.; Qiu, J. R.; Hirao, K.
CS Photon Craft Project, JST, ICORP, 1-7 Hikaridai, Seika-cho, Kyoto, 619-0237, Japan
SO Applied Physics B: Lasers and Optics (2002), 75(8), 847-851
CODEN: APBOEM; ISSN: 0946-2171
PB Springer-Verlag
DT Journal
LA English
CC 74-8 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
AB Volume holog. gratings and two-dimensional periodic microstructures in azo dye-doped poly(Me methacrylate) were fabricated, resp., by interference of two coherent beams of a femtosecond laser and by interference of three coherent beams of a nanosecond laser. The dependence of the first-order Bragg **diffraction** efficiency and the photoinduced **refractive**-index modulation of the gratings on the intensity of the writing light was investigated. The measurements of the absorption spectra before and after irradiation with the writing light suggest that the photoinduced gratings were **refractive**-index-modulated gratings, which arose from a photoinduced decomposition reaction of the azo dye mols. through **multiphoton** absorption. In the expts. involving the interference of three beams, the period of the two-dimensional periodic microstructures was changed by adjusting the angle between the three writing beams.
ST photofabrication periodic microstructure azo dye doped polymer; vol holog grating recording azo dye doped PMMA

IT Laser ablation
Microstructure
(fabrication of two-dimensional periodic microstructures in azo dye-doped PMMA by interference of three coherent beams of nanosecond laser beams)
IT Holographic **diffraction** gratings
Holography
Multiphoton absorption
(fabrication of volume holog. gratings in azo dye-doped PMMA by interference of femtosecond laser beams via **multiphoton** -induced photodecompn. of dopant dye)
IT Photolysis
(**multiphoton**; fabrication of volume holog. gratings in azo dye-doped PMMA by interference of femtosecond laser beams via **multiphoton**-induced photodecompn. of dopant dye)
IT 9011-14-7, PMMA
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(fabrication of volume holog. gratings and two-dimensional periodic microstructures in azo dye-doped PMMA)
IT 144748-38-9
RL: RCT (Reactant); RACT (Reactant or reagent)
(fabrication of volume holog. gratings in azo dye-doped PMMA by interference of femtosecond laser beams via **multiphoton** -induced photodecompn. of dopant dye)
RE.CNT 19 THERE ARE 19 CITED REFERENCES AVAILABLE FOR THIS RECORD
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(2) Campbell, M; Nature (London) 2000, V404, P53 CAPLUS
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L7 ANSWER 3 OF 9 CAPLUS
AN 2002:438354 CAPLUS
DN 137:176350
ED Entered STN: 11 Jun 2002
TI In situ observation of dynamics of plasma formation and **refractive** index modification in silica glasses excited by a femtosecond laser
AU Cho, Sung-Hak; Kumagai, Hiroshi; Midorikawa, Katsumi
CS Laser Technology Laboratory, The Institute of Physical and Chemical Research (RIKEN), Wako, Saitama, 351-0198, Japan
SO Optics Communications (2002), 207(1-6), 243-253
CODEN: OPCOB8; ISSN: 0030-4018
PB Elsevier Science B.V.
DT Journal

LA English

CC 73-2 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 57, 76, 77

AB Time-resolved dynamics of plasma formation and bulk **refractive** index modification in SiO2 glasses excited by a tightly focused femtosecond (110 fs) Ti:sapphire laser (λp=800 nm) was 1st observed in situ. The newly proposed pump-probe measurement with perpendicularly linear polarized beams was used to study the dynamic of both plasma formation and induced **refractive** index bulk modification. The energy variation of transmitted probe beam with time delay, which propagates through the induced plasma is measured. At the pre-breakdown domain, the lifetime of induced plasma formation is .apprx.15 ps and structural transition time for forming the **refractive** index change is .apprx.10 ps. At the breakdown domain, however, the lifetime of induced plasma formation is .apprx.35 ps and structural transition time for forming the optical damage is .apprx.35 ps. The process of **refractive** index bulk modification is significantly different from that of optical damage. According to the ESR spectroscopic measurement, the defect concentration of SiE' center increased significantly in the modified region in related to that of the region without modification. From the **diffraction** efficiency of Kogelnik's coupled mode theory, the maximum value of **refractive** index change (Δn) is 1.1 + 10-2.
By the scanning of SiO2 glass on the optical X-Y-Z stages, the fabrication of the internal grating with **refractive** index modification was demonstrated in SiO2 glass using tightly focused femtosecond laser. The exptl. results will be helpful to understand the phys. mechanism of the plasma and structural transformation induced by tightly focused high-intensity femtosecond lasers in transparent materials.

ST silica glass laser plasma dynamics **refractive** index ESR photorefraction; self focusing silica glass laser irradn; **multiphoton** ionization silica glass laser irradn; paramagnetic defect silica glass laser irradn ESR; **diffraction** optical silica glass laser irradn photorefraction

IT Defects in solids
ESR (electron spin resonance)
Laser induced plasma
Optical damage threshold
Optical **diffraction**
Paramagnetic centers
Photorefractive effect
Refractive index
Structural phase transition
(in situ observation of dynamics of plasma formation and **refractive** index modification in silica glasses excited by femtosecond laser)

IT Photoionization
(**multiphoton**; in situ observation of dynamics of plasma formation and **refractive** index modification in silica glasses excited by femtosecond laser)

IT Optical properties
(self-focusing; in situ observation of dynamics of plasma formation and **refractive** index modification in silica glasses excited by femtosecond laser)

IT 60676-86-0, Vitreous silica
RL: PRP (Properties)
(in situ observation of dynamics of plasma formation and **refractive** index modification in silica glasses excited by femtosecond laser)

RE.CNT 29 THERE ARE 29 CITED REFERENCES AVAILABLE FOR THIS RECORD

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L7 ANSWER 4 OF 9 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2002:160423 CAPLUS
DN 136:207766
ED Entered STN: 05 Mar 2002
TI Method and apparatus for laser marking and marked optical materials
IN Hayashi, Kenichi
PA Sumitomo Heavy Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM B23K026-00
ICS B23K026-06; B23K026-08; B41J002-44; C03C023-00; G02B005-18; G02B005-32
CC 74-8 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 73
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2002066769	A2	20020305	JP 2000-257182	20000828
	JP 3522670	B2	20040426		
PRAI	JP 2000-257182		20000828		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2002066769	ICM	B23K026-00
	ICS	B23K026-06; B23K026-08; B41J002-44; C03C023-00; G02B005-18; G02B005-32

AB The apparatus comprises a laser beam source, a hologram plate, an optical scanning system for deflection of the **diffraction** beams, an optical focusing system for convergence of the **diffraction** beams, and a stage for placing the marking substrate at the positions where the **diffraction** beams are converged. Marking of materials by forming multiple nos. of points having varied **refractive** index caused by **multiphoton** absorption is claimed. Optical materials marked with patterns that **diffract** visible light and method for marking are also claimed. Easily visible markings are formed without damaging the marked materials.
ST laser marking app optical material; **multiphoton** absorption laser marking; grating laser induced marking holog
IT Holographic **diffraction** gratings
Laser induced grating
(apparatus for highly visible laser marking of materials without their damaging)
IT Marking
(laser; apparatus for highly visible laser marking of materials without their damaging)
IT **Multiphoton** absorption
(marking by; apparatus for highly visible laser marking of materials without their damaging)
IT Glass, processes
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(marking of; apparatus for highly visible laser marking of materials without their damaging)

L7 ANSWER 5 OF 9 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2001:907640 CAPLUS
DN 136:207283
ED Entered STN: 17 Dec 2001
TI Interplay between self-focusing and high-order **multiphoton** absorption
AU Polyakov, Sergey; Yoshino, Fumiyo; Stegeman, George
CS School of Optics and Center for Research and Education in Optics and Lasers, University of Central Florida, Orlando, FL, 32816, USA
SO Journal of the Optical Society of America B: Optical Physics (2001), 18(12), 1891-1895
CODEN: JOBPDE; ISSN: 0740-3224
PB Optical Society of America
DT Journal
LA English
CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
AB The authors study the distortion of optical beams that is due to the combined effects of strong self-focusing and 3- and 4-photon absorption, a situation that exists, for example, in the polydiacetylene bis-paratoluene sulfonate (PTS). The characteristic nonlinear distances were defined for each process. Theor. anal. of the beam propagation leads to 2 distinct limits, 1 limit dominated by self-focusing and the other by higher-order absorption. Propagation was studied anal. and numerically for continuous-wave and pulsed beams in these 2 limits and for cases in which both nonlinear effects are important. Beam distortion caused by **multiphoton** absorption and **refraction** leads to situations in which **diffraction** plays an important role, even for input beams whose **diffraction** length is much larger than the sample length. For the typical intensities used in Z-scan measurements, nonlinear processes and **diffraction** contribute simultaneously to beam distortion and must be taken into account.

ST interplay focusing **multiphoton** absorption
IT Optical absorption
(interplay between self-focusing and high-order **multiphoton** absorption)
IT 32535-60-7
RL: PRP (Properties)
(interplay between self-focusing and high-order **multiphoton** absorption)
RE.CNT 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
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L7 ANSWER 6 OF 9 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2001:734065 CAPLUS
DN 135:296267
ED Entered STN: 09 Oct 2001
TI Method of making visible marks in a transparent material by laser beam radiation, marking apparatus, and transparent optical member marked by the method
IN Hayashi, Kenichi; Ito, Kazuyoshi
PA Sumitomo Heavy Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM B23K026-00
ICS B23K026-00; B23K026-04; B23K026-08; C03C023-00; G02B005-18
CC 74-13 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 73
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2001276985	A2	20011009	JP 2000-258854	20000829
	JP 3522671	B2	20040426		
	US 2002041323	A1	20020411	US 2001-940604	20010829
	US 6621041	B2	20030916		
PRAI	JP 2000-19062	A	20000127		
	JP 2000-258854	A	20000829		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES

```
 JP 2001276985    ICM    B23K026-00
                  ICS    B23K026-00; B23K026-04; B23K026-08; C03C023-00;
                         G02B005-18
 US 2002041323    ECLA   G02B005/18M2
AB   In marking a transparent material, a laser beam of wavelength capable of
     transmitting the material is focused on inner part of the transparent
     material to allow multiphoton absorption and cause n changes,
     and the focal point of the laser beam is so moved as to form a
     diffraction pattern which diffracts a visible ray.  An
     optically marking apparatus is equipped with a stage for loading the material,
     a light source emitting the laser beam, an optical system for focusing the
     laser beam, and a means of moving the focal point to form the
     diffraction grating.  A transparent optical member, marked by the
     method, has the diffraction pattern inside.  Alternatively, a
     method of marking marks in a material comprises the following steps; (1)
     irradiating the material with a pulsed laser beam by changing NA of an
     object lens and energy intensity per one pulse (EI) to form optically
     modified region, (2) determining a function of NA, EI, and length of modified
     region (LE), (3) determining NA and EI from the required LE by using the
     function, and (4) irradiating the laser beam to form the modified region.
     The marking method does not cause damage or drop in strength of the
     material, and the formed mark can be easily recognized without using a
     readout apparatus
ST   transparent material marking laser radiation n change; diffraction
     grating formation laser radiation transparent material marking;
     multiphoton absorption laser induced diffraction grating
     marking; glass marking laser induced diffraction grating
IT   Refractive index
        (changes; making visible marks in transparent material by laser beam
        radiation, marking apparatus, and mark-formed transparent optical member)
IT   Multiphoton absorption
        (laser radiation; making visible marks in transparent material by laser
        beam radiation, marking apparatus, and mark-formed transparent optical
        member)
IT   Laser induced grating
     Marking
     Transparent materials
        (making visible marks in transparent material by laser beam radiation,
        marking apparatus, and mark-formed transparent optical member)
IT   Laser radiation
        (pulsed; making visible marks in transparent material by laser beam
        radiation, marking apparatus, and mark-formed transparent optical member)
IT   Glass substrates
        (transparent; making visible marks in transparent material by laser
        beam radiation, marking apparatus, and mark-formed transparent optical
        member)

L7   ANSWER 7 OF 9  CAPLUS  COPYRIGHT 2004 ACS on STN
AN   2001:243986  CAPLUS
DN   135:26571
ED   Entered STN:  06 Apr 2001
TI   Arbitrary-lattice photonic crystals created by multiphoton
     micro-fabrication
AU   Sun, Hong-Bo; Xu, Ying; Juodkazis, Saulius; Sun, Kai; Watanabe, Mitsuru;
     Matsuo, Shigeki; Misawa, Hiroaki; Nishii, Junji
CS   Satellite Venture Business Laboratory, The University of Tokushima,
     Tokushima, 770-8506, Japan
SO   Optics Letters (2001), 26(6), 325-327
     CODEN: OPLEDP; ISSN: 0146-9592
PB   Optical Society of America
```

DT Journal
LA English
CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
AB The authors used voxels of an intensely modified **refractive** index generated by **multiphoton** absorption at the focus of femtosecond laser pulses in Ge-doped SiO2 as photonic atoms to build photonic lattices. The voxels were spatially organized in the same way as atoms arrayed in actual crystals, and a Bragg-like **diffraction** from the photonic atoms was evidenced by a photonic bandgap (PBG) effect. Post-fabrication annealing is essential for reducing random scattering and therefore enhancing PBG. This technique has an intrinsic capability of individually addressing single atoms. Therefore the introduction of defect structures was much facilitated, making the technique quite appealing for photonic research and applications.
ST photonic crystal **multiphoton** microfabrication
IT Annealing
Band gap
Multiphoton absorption
Optical **diffraction**
Optical **refraction**
Photonic crystals
Photonics
Solid state lasers
(arbitrary-lattice photonic crystals created by **multiphoton** micro-fabrication)
IT 7631-86-9, Silica, uses
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(arbitrary-lattice photonic crystals created by **multiphoton** micro-fabrication)
IT 1310-53-8, Germanium oxide (GeO2), uses 7440-56-4, Germanium, uses 13463-67-7, Titania, uses
RL: MOA (Modifier or additive use); USES (Uses)
(arbitrary-lattice photonic crystals created by **multiphoton** micro-fabrication)
RE.CNT 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
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L7 ANSWER 8 OF 9 CAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:535149 CAPLUS
DN 131:264484
ED Entered STN: 26 Aug 1999

TI Enhanced photosensitivity in germanosilicate fibers exposed to CO2 laser radiation
AU Brambilla, G.; Pruneri, V.; Reekie, L.; Payne, D. N.
CS Optoelectronics Research Centre, Southampton University, Southampton, SO17-1BJ, UK
SO Optics Letters (1999), 24(15), 1023-1025
CODEN: OPLEDP; ISSN: 0146-9592
PB Optical Society of America
DT Journal
LA English
CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 57, 74
AB The authors report a novel method to increase the UV photosensitivity of GeO2:SiO2 optical fibers based on exposure to CO2 laser irradiation before grating writing. Fibers treated with a CO2 laser can produce gratings with **refractive**-index modulation 2 times greater and a Bragg wavelength that can be 2 nm longer than those of untreated fibers. Expts. on GeO2:SiO2 preform samples treated with a CO2 laser in a way similar to the fibers showed a marked increase of the 242-nm absorption band, which is associated with an increase of Ge O-deficient centers and is believed to be responsible for the higher photorefractive response.
ST photosensitivity germanosilicate optical fiber carbon dioxide laser radiation; **diffraction** grating germanosilicate optical fiber photosensitivity laser irradn; **multiphoton** absorption germanosilicate optical fiber photosensitivity laser irradn; photorefraction germanosilicate optical fiber photosensitivity laser irradn; near IR reflection germanosilicate optical fiber **diffraction** grating photosensitivity; UV optical fiber preform photosensitivity laser irradn
IT **Diffraction** gratings
Laser radiation
Multiphoton absorption
Optical fibers
Photorefractive effect
UV and visible spectra
(enhanced photosensitivity in germanosilicate optical fibers exposed to CO2 laser radiation with **diffraction** gratings)
IT IR reflectance spectra
(near-IR; enhanced photosensitivity in germanosilicate optical fibers exposed to CO2 laser radiation with **diffraction** gratings)
IT Germanosilicate glasses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(optical fibers; enhanced photosensitivity in germanosilicate optical fibers exposed to CO2 laser radiation with **diffraction** gratings)
IT Glass fibers, properties
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(optical germanosilicate; enhanced photosensitivity in germanosilicate optical fibers exposed to CO2 laser radiation with **diffraction** gratings)
IT Defects in solids
(oxygen-deficient; enhanced photosensitivity in germanosilicate optical fibers exposed to CO2 laser radiation with **diffraction** gratings)
IT 1310-53-8, Germania, properties 60676-86-0, Vitreous silica
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)

(enhanced photosensitivity in germanosilicate optical fibers exposed to CO_2 laser radiation with **diffraction** gratings)
RE.CNT 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE

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L7 ANSWER 9 OF 9 CAPLUS COPYRIGHT 2004 ACS on STN
AN 1974:483774 CAPLUS
DN 81:83774
ED Entered STN: 12 May 1984
TI **Multiphoton** photorefractive processes for optical storage in lithium niobate(V)
AU Von der Linde, D.; Glass, A. M.; Rodgers, K. F.
CS Bell Lab., Murray Hill, NJ, USA
SO Applied Physics Letters (1974), 25(3), 155-7
CODEN: APPLAB; ISSN: 0003-6951
DT Journal
LA English
CC 73-2 (Spectra by Absorption, Emission, Reflection, or Magnetic Resonance, and Other Optical Properties)
AB Permanent reversible changes of the n of pure and doped $LiNbO_3$ were obtained by **multiphoton** absorption. Greatly increased sensitivity over the linear process enables holograms to be recorded even in high-purity $LiNbO_3$, with a **diffraction** efficiency of 25% with less than 0.4 J/cm2. These holograms can be read nondestructively, eliminating the need for fixing processes while the versatility of optical erasure is maintained.
ST **multiphoton** lithium niobate **refraction**; hologram lithium niobate **multiphoton**
IT Photon
(absorption of many, lithium niobate **refractive** index change in)
IT Holography
(lithium niobate **multiphoton** photorefractive process in)
IT **Refractive** index and **Refraction**
(permanent reversible changes of, by **multiphoton** absorption)
IT 12031-63-9
RL: USES (Uses)
(**multiphoton** photorefractive change of, in holog.)

=> d his

(FILE 'HOME' ENTERED AT 10:55:31 ON 26 OCT 2004)

FILE 'CAPLUS' ENTERED AT 10:55:46 ON 26 OCT 2004
L1 13877 S (MULTIPHOTON OR MULTIPLE PHOTON)
L2 81 S L1 AND REFRACTIVE
L3 109 S L1 AND REFRACT?

STN search for10/622488

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L4             11 S L3 AND VISIBLE
L5            109 S (MULTIPHOTON OR MULTIPLE PHOTON) AND REFRACT?
L6            106 S (MULTIPHOTON OR MULTIPLE PHOTON) AND DIFFRACT?
L7              9 S L5 AND L6

=> s l7 and visibl?
        289564 VISIBL?
L8              3 L7 AND VISIBL?

=> d all 1-3

L8   ANSWER 1 OF 3  CAPLUS  COPYRIGHT 2004 ACS on STN
AN   2002:160423  CAPLUS
DN   136:207766
ED   Entered STN:  05 Mar 2002
TI   Method and apparatus for laser marking and marked optical materials
IN   Hayashi, Kenichi
PA   Sumitomo Heavy Industries, Ltd., Japan
SO   Jpn. Kokai Tokkyo Koho, 5 pp.
     CODEN: JKXXAF
DT   Patent
LA   Japanese
IC   ICM  B23K026-00
     ICS  B23K026-06; B23K026-08; B41J002-44; C03C023-00; G02B005-18;
          G02B005-32
CC   74-8 (Radiation Chemistry, Photochemistry, and Photographic and Other
     Reprographic Processes)
     Section cross-reference(s): 73
FAN.CNT 1
     PATENT NO.            KIND   DATE       APPLICATION NO.       DATE
     ---------------       ----   --------   -------------------   --------
PI   JP 2002066769          A2    20020305   JP 2000-257182        20000828
     JP 3522670             B2    20040426
PRAI JP 2000-257182               20000828
CLASS
 PATENT NO.      CLASS  PATENT FAMILY CLASSIFICATION CODES
 -------------   -----  -----------------------------------------------
 JP 2002066769   ICM    B23K026-00
                 ICS    B23K026-06; B23K026-08; B41J002-44; C03C023-00;
                        G02B005-18; G02B005-32
AB   The apparatus comprises a laser beam source, a hologram plate, an optical
     scanning system for deflection of the diffraction beams, an
     optical focusing system for convergence of the diffraction
     beams, and a stage for placing the marking substrate at the positions
     where the diffraction beams are converged.  Marking of materials
     by forming multiple nos. of points having varied refractive
     index caused by multiphoton absorption is claimed.  Optical
     materials marked with patterns that diffract visible
     light and method for marking are also claimed.  Easily visible
     markings are formed without damaging the marked materials.
ST   laser marking app optical material; multiphoton absorption laser
     marking; grating laser induced marking holog
IT   Holographic diffraction gratings
     Laser induced grating
        (apparatus for highly visible laser marking of materials without
        their damaging)
IT   Marking
        (laser; apparatus for highly visible laser marking of materials
        without their damaging)
IT   Multiphoton absorption
```

(marking by; apparatus for highly **visible** laser marking of materials without their damaging)

IT Glass, processes
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(marking of; apparatus for highly **visible** laser marking of materials without their damaging)

L8 ANSWER 2 OF 3 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2001:734065 CAPLUS
DN 135:296267
ED Entered STN: 09 Oct 2001
TI Method of making **visible** marks in a transparent material by laser beam radiation, marking apparatus, and transparent optical member marked by the method
IN Hayashi, Kenichi; Ito, Kazuyoshi
PA Sumitomo Heavy Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM B23K026-00
ICS B23K026-00; B23K026-04; B23K026-08; C03C023-00; G02B005-18
CC 74-13 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 73
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2001276985	A2	20011009	JP 2000-258854	20000829
	JP 3522671	B2	20040426		
	US 2002041323	A1	20020411	US 2001-940604	20010829
	US 6621041	B2	20030916		
PRAI	JP 2000-19062	A	20000127		
	JP 2000-258854	A	20000829		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2001276985	ICM	B23K026-00
	ICS	B23K026-00; B23K026-04; B23K026-08; C03C023-00; G02B005-18
US 2002041323	ECLA	G02B005/18M2

AB In marking a transparent material, a laser beam of wavelength capable of transmitting the material is focused on inner part of the transparent material to allow **multiphoton** absorption and cause n changes, and the focal point of the laser beam is so moved as to form a **diffraction** pattern which **diffracts** a **visible** ray. An optically marking apparatus is equipped with a stage for loading the material, a light source emitting the laser beam, an optical system for focusing the laser beam, and a means of moving the focal point to form the **diffraction** grating. A transparent optical member, marked by the method, has the **diffraction** pattern inside. Alternatively, a method of marking marks in a material comprises the following steps; (1) irradiating the material with a pulsed laser beam by changing NA of an object lens and energy intensity per one pulse (EI) to form optically modified region, (2) determining a function of NA, EI, and length of modified region (LE), (3) determining NA and EI from the required LE by using the function, and (4) irradiating the laser beam to form the modified region. The marking method does not cause damage or drop in strength of the material, and the formed mark can be easily recognized without using a

readout apparatus
ST transparent material marking laser radiation n change; **diffraction** grating formation laser radiation transparent material marking; **multiphoton** absorption laser induced **diffraction** grating marking; glass marking laser induced **diffraction** grating
IT **Refractive** index
(changes; making **visible** marks in transparent material by laser beam radiation, marking apparatus, and mark-formed transparent optical member)
IT **Multiphoton** absorption
(laser radiation; making **visible** marks in transparent material by laser beam radiation, marking apparatus, and mark-formed transparent optical member)
IT Laser induced grating
Marking
Transparent materials
(making **visible** marks in transparent material by laser beam radiation, marking apparatus, and mark-formed transparent optical member)
IT Laser radiation
(pulsed; making **visible** marks in transparent material by laser beam radiation, marking apparatus, and mark-formed transparent optical member)
IT Glass substrates
(transparent; making **visible** marks in transparent material by laser beam radiation, marking apparatus, and mark-formed transparent optical member)

L8 ANSWER 3 OF 3 CAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:535149 CAPLUS
DN 131:264484
ED Entered STN: 26 Aug 1999
TI Enhanced photosensitivity in germanosilicate fibers exposed to CO2 laser radiation
AU Brambilla, G.; Pruneri, V.; Reekie, L.; Payne, D. N.
CS Optoelectronics Research Centre, Southampton University, Southampton, SO17-1BJ, UK
SO Optics Letters (1999), 24(15), 1023-1025
CODEN: OPLEDP; ISSN: 0146-9592
PB Optical Society of America
DT Journal
LA English
CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 57, 74
AB The authors report a novel method to increase the UV photosensitivity of GeO2:SiO2 optical fibers based on exposure to CO2 laser irradiation before grating writing. Fibers treated with a CO2 laser can produce gratings with **refractive**-index modulation 2 times greater and a Bragg wavelength that can be 2 nm longer than those of untreated fibers. Expts. on GeO2:SiO2 preform samples treated with a CO2 laser in a way similar to the fibers showed a marked increase of the 242-nm absorption band, which is associated with an increase of Ge O-deficient centers and is believed to be responsible for the higher photorefractive response.
ST photosensitivity germanosilicate optical fiber carbon dioxide laser radiation; **diffraction** grating germanosilicate optical fiber photosensitivity laser irradn; **multiphoton** absorption germanosilicate optical fiber photosensitivity laser irradn; photorefraction germanosilicate optical fiber photosensitivity laser irradn; near IR reflection germanosilicate optical fiber **diffraction** grating photosensitivity; UV optical fiber preform

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     photosensitivity laser irradn
IT   Diffraction gratings
     Laser radiation
       Multiphoton absorption
     Optical fibers
     Photorefractive effect
     UV and visible spectra
        (enhanced photosensitivity in germanosilicate optical fibers exposed to
        CO2 laser radiation with diffraction gratings)
IT   IR reflectance spectra
        (near-IR; enhanced photosensitivity in germanosilicate optical fibers
        exposed to CO2 laser radiation with diffraction gratings)
IT   Germanosilicate glasses
     RL: DEV (Device component use); PEP (Physical, engineering or chemical
     process); PRP (Properties); PROC (Process); USES (Uses)
        (optical fibers; enhanced photosensitivity in germanosilicate optical
        fibers exposed to CO2 laser radiation with diffraction
        gratings)
IT   Glass fibers, properties
     RL: DEV (Device component use); PEP (Physical, engineering or chemical
     process); PRP (Properties); PROC (Process); USES (Uses)
        (optical germanosilicate; enhanced photosensitivity in germanosilicate
        optical fibers exposed to CO2 laser radiation with diffraction
        gratings)
IT   Defects in solids
        (oxygen-deficient; enhanced photosensitivity in germanosilicate optical
        fibers exposed to CO2 laser radiation with diffraction
        gratings)
IT   1310-53-8, Germania, properties   60676-86-0, Vitreous silica
     RL: DEV (Device component use); PEP (Physical, engineering or chemical
     process); PRP (Properties); PROC (Process); USES (Uses)
        (enhanced photosensitivity in germanosilicate optical fibers exposed to
        CO2 laser radiation with diffraction gratings)
RE.CNT  12     THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD
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